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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/845,356	05/01/2001	Masayuki Mishima	Q64324	2603

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EXAMINER	
YAMNITZKY, MARIE ROSE	
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1774	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/845,356	MISHIMA, MASAYUKI	
	Examiner	Art Unit	
	Marie R. Yamnitzky	1774	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 June 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *29-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *29-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. This Office action is in response to applicant's amendment filed June 12, 2007, which cancels claims 25-28 and amends claim 29.

Claims 29-32 are pending.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 29-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baldo et al. in *Appl. Phys. Lett.* 75(1), pp. 4-6 (July 5, 1999) or Forrest et al. (US 6,310,360 B1), either reference in view of Egusa et al. (US 5,294,810), and further in view of Kido et al. in *Science*, Vol. 267, pp. 1332-1334 (March 1995) or JP 07-142169.

Baldo et al. disclose light-emitting devices comprising a glass substrate, an anode, a hole transporting layer, an organic compound layer including a light-emitting layer containing two light emitting materials, an electron transporting layer, and a cathode. See the whole reference. In various devices, the light-emitting layer contains $Ir(ppy)_3$ and CBP. Baldo et al. also disclose a device in which the light-emitting layer contains $Ir(ppy)_3$ and Alq_3.

Forrest et al. disclose light-emitting devices comprising a glass substrate, an anode, a hole transporting layer, an organic compound layer including a light-emitting layer/zone containing three light emitting materials, an electron transporting layer, and a cathode. See the entire patent

to Forrest et al. In particular, see Fig. 1, Fig. 3, column 9, line 1 - c. 11, l. 60, c. 12, l. 58 - c. 13, l. 50, c. 14, l. 63 - c. 15, l. 17 and c. 17, l. 9 - c. 19, l. 19. Note that c. 11, l. 57 contains an error in that λ for $Ir(ppy)_3$ should read ---~500 nm-- rather than "~400 nm". In Forrest's Example 1, the light-emitting layer consists of an alternating series of layers of CBP doped with $Ir(ppy)_3$ and CBP doped with DCM2.

"CBP" stands for 4,4'-N,N'-dicarbazole-biphenyl, which is a blue light-emitting material having a light-emitting wavelength peak of about 400 nm.

"$Ir(ppy)_3$" stands for *fac* tris(2-phenylpyridine) iridium, which is a green light-emitting orthometallated complex of iridium having a light-emitting wavelength peak of about 500 nm.

"Alq_3" stands for tris-(8-hydroxyquinoline) aluminum, which is a green light-emitting material.

"DCM2" is the abbreviation for a pyran compound that is a red light-emitting compound having a light-emitting wavelength peak of about 590 nm (the full name is given at c. 4, l. 56-58 and the formula is shown at the bottom of c. 9 of the patent to Forrest et al.).

Baldo et al. or Forrest et al. disclose devices comprising more than one light-emitting material, each of the materials capable of emitting light of a different color, wherein one of the materials is an orthometallated complex. In Baldo's device comprising CBP doped with $Ir(ppy)_3$, a single light-emitting layer contains green and blue light-emitting materials. In Forrest's device of Example 1, green and blue-light emitting materials are contained in one light-emitting layer while red and blue-light emitting materials are contained in a second light-emitting layer.

The prior art devices of Baldo et al. or Forrest et al. do not have separate red, green and blue light emitting layers as required by claims 29-32. The prior art devices of Baldo et al. or Forrest et al. do not emit white light as required by the present claims.

Further, in the devices of Baldo et al. or Forrest et al., the light-emitting layer(s) only comprise(s) one orthometallated complex rather than at least two as required by present claim 30, or at least three as required by present claim 31.

It was known in the art at the time of the invention that the color of light emitted by a light-emitting device can be controlled by the selection of light-emitting materials used in the device, and that emission of white light can be achieved by providing an appropriate combination of light-emitting materials.

Egusa et al. disclose light-emitting devices, teach that a light-emitting device may comprise more than one light-emitting layer (e.g. see column 11, line 40 - c. 12, l. 60 and c. 19, l. 52 - c. 20, l. 61), teach that different light-emitting materials may be mixed in a light-emitting layer in order to control light-emission wavelength and that the mixture may include a phosphorescent material emitting light from a triplet excited state (e.g. see c. 25, l. 36 - c. 27, l. 15), and teach that it is possible to achieve emission of white light from a device comprising multiple light-emitting layers and from a device comprising a mixture of light-emitting materials (e.g. see c. 20, l. 57-61 and c. 26, l. 15-28).

It would have been an obvious modification to one of ordinary skill in the art at the time of the invention to provide light-emitting devices similar to those disclosed by Baldo et al. or Forrest et al. but utilizing different and/or additional light-emitting materials in combination with

the iridium complex either in the same layer or in a light-emitting layer separate from the layer comprising the iridium complex. One of ordinary skill in the art would have been motivated to utilize different and/or additional light-emitting materials in combination with the iridium complex so as to provide a device having the advantages of using a phosphorescent material as taught by Baldo et al. or Forrest et al. while at the same time being able to modify the color of light emitted by the device as taught by Egusa et al. It would have been within the level of ordinary skill of a worker in the art at the time of the invention, as a matter of routine experimentation, to determine suitable and optimum combinations of light-emitting materials selected from known light-emitting materials so as to obtain a functional device capable of emitting light of the color(s) desired. One of ordinary skill in the art would have been motivated to select a combination of light-emitting materials capable of providing white light when the light-emitting device was intended to be used for an application where white light was desirable.

The present claims require the different light-emitting layers to be arranged in an order of increasing wavelength from the anode to the cathode (red light having a longer wavelength than green light which, in turn, has a longer wavelength than blue light). Egusa et al. disclose that white light emission may be achieved using different layer orders of longer and shorter wavelength emitters between the electrodes. Columns 19-23, for example, discuss white light emission from a device of the layered structure shown in Fig. 17 wherein the layers are provided in the order of anode, longer wavelength emitter, shorter wavelength emitter, cathode, and white light emission from a device of the layered structure shown in Fig. 21 wherein the layers are provided in the order of anode, shorter wavelength emitter, longer wavelength emitter, cathode.

It would have been within the level of ordinary skill of a worker in the art at the time of the invention to determine suitable layered arrangements of different emitting layers. Given Egusa's examples, one of ordinary skill in the art at the time of the invention would have reasonably expected that when using a combination of red, green and blue emitters, functional white light emitting devices could be constructed by having the blue emitter closest to the anode and the red emitter closest to the cathode.

Further, one of ordinary skill in the art at the time of the invention, having knowledge of the disclosure of the *Science* article by Kido et al. or knowledge of the disclosure of JP 07-142169, would have reasonably expected that white light emission could be obtained by providing different emitting materials between anode and cathode in the order of anode, blue emitter, green emitter, red emitter, cathode. In *Science*, Vol. 267, Kido et al. provide a white light-emitting device comprising three emitter layers that generate blue, green and red light, respectively, with the electrodes and emitter layers being provided in the order of: anode, blue emitting layer, green emitting layer, red emitting layer, cathode. JP 07-142169 discloses a white light-emitting device utilizing blue, green and red emitters, with layered device structures disclosed in this reference including multiple light-emitting layers/regions between an anode and a cathode. JP 07-142169 discloses different arrangements capable of emitting white light, including the arrangements of: anode, blue, green, red, cathode (as described in reference to Fig. 2); anode, blue, red, green, cathode (as described in reference to Fig. 3); anode, blue, green, red, green, cathode (as described in reference to Fig. 4).

While Kido et al. and JP 07-142169 only utilize fluorescent emitters, these references demonstrate that applicant's layer order of anode, blue emitter, green emitter, red emitter, cathode to provide white light was known in the art at the time of the invention.

With respect to claim 32, one of ordinary skill in the art at the time of the invention would have recognized that in order to provide a white light emitting device as taught by Egusa et al., a device would have to be provided with two or more light-emitting materials that emit light when an electric field is applied across the electrodes of the device.

With respect to the requirement for more than one orthometallated complexes as in claims 30 and 31, Baldo et al. or Forrest et al. disclose an orthometallated complex that is a green light-emitting material, and orthometallated complexes that emit blue or that emit red are known. The selection of suitable and optimum combinations of red, green and blue light-emitting materials from known materials in order to achieve white light would have been within the level of ordinary skill of a worker in the art at the time of the invention as a matter of routine experimentation.

4. Applicant's arguments filed June 12, 2007 have been fully considered but they are not persuasive.

Applicant argues that none of the cited references discloses that a blue light-emitting material, a green light-emitting material and a red light-emitting material should be contained in different layers in the order listed in present claim 29.

This argument is not persuasive as Egusa's disclosure demonstrates that it was known in the art at the time of the invention that white light emission could be obtained by providing multiple light-emitting layers in different orders between an anode and a cathode (i.e. different orders of longer wavelength emitting layer vs. shorter wavelength emitting layer). Kido et al. and JP 07-142169 also demonstrate that the arrangement of blue, green and red emitters, in that order, between an anode and cathode, was known at the time of the invention to be capable of emitting white light. JP 07-142169 further demonstrates that different arrangements were also known at the time of the invention to be capable of emitting white light.

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 7:00 a.m. to 3:30 p.m. Monday-Friday.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY
September 03, 2007

Marie R. Yamnitzky

MARIE YAMNITZKY
PRIMARY EXAMINER
1774